

1 We Claim:

1. A load change safety system for a sheet stacker having a stacking deck formed with a discharge end for discharging sheet material onto and building sheet stacks on a conveying sheet material removal system formed with a
5 receiving means comprising:
 - a. a variable pinch point gap formed by relative motion between said discharge end of said stacking deck of said sheet stacker and said receiving means of said conveying sheet material removal system; and
 - b. redundant means for selectively preventing a decrease in
10 said variable pinch point gap.
2. A load change safety system as described in claim 1 comprising:
 - a. said redundant means includes a plurality of hydraulic cylinders for raising and lowering said stacking deck;
 - b. said hydraulic cylinders are of adequate strength such that
15 should one cylinder fail to provide support for said stacking deck, the remaining cylinder(s) can support the weight of said stacking deck;
 - c. a plurality of valves, wherein at least one valve is independently connected to each of said cylinders, which may selectively and alternatively permit and prevent flow of fluid from those of said hydraulic cylinder(s) which are operating normally and have not failed, thereby resulting in rapidly preventing said variable pinch point gap from narrowing; and
 - d. control means operatively and independently connected to each of
20 said valves for alternatively permitting and preventing flow of fluid from said hydraulic cylinders.
3. A load change safety system as described in claim 2 wherein:
 - a. said plurality of hydraulic cylinders for raising and lowering said stacking deck is limited to a pair of hydraulic cylinders.

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- 1 4. A load change safety system as described in claim 1 comprising:
 - a. said conveying sheet material removal system includes an elevating platform 16' and
 - b. said redundant means include one or more hydraulic cylinders for raising and lowering elevating platform
 - 5 c. a plurality of valves, wherein said valves are operatively connected to each other and said cylinder(s) by means such that all of said valves must simultaneously be activated and operate normally for selectively and alternatively permitting and prevent flow into said hydraulic cylinder(s) which are operating normally and have not failed, thereby preventing said variable pinch point gap from narrowing; and
 - 10 d. control means operatively and independently connected to each of said valves, for alternatively permitting and preventing flow of fluid into said hydraulic cylinders.
- 15 5. A load change safety system as described in claim 1 wherein:
 - a. said redundant means includes control means for detecting an event requiring activation of said redundant means
6. A load change safety system as described in claim 5 comprising:
 - a. sensor means;
 - 20 b. said sensor means include hydraulic position sensors operatively connected to said hydraulic cylinders for detecting a condition requiring activation of said hydraulic cylinders;
 - c. each of said hydraulic position sensors is individually and independently operatively connected to said control means and to said stacking deck;
 - 25 d. said hydraulic position sensors having a first position activated by a predefined raised position of an associated hydraulic cylinder ; and
 - e. said hydraulic position sensors having a second position activated by a loss of support of associated hydraulic cylinder due to a malfun-

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1 tion where hydraulic cylinders are operatively connected to said
stacking deck where said control means signal to said plurality of
valves to prevent flow of fluid from said hydraulic cylinders, thereby
preventing said variable pinch point gap from decreasing.

5 7. A load change safety system for a sheet stacker as described in claim 1
comprising:

10 a. an electro-optical light guard means operably connected to said
redundant means with one or more redirections of one or more light
beams to create a light guard perimeter for guarding portions of said
sheet stacker and portions of said conveying sheet material removal
system;

15 b. said electro-optical light guard means including one or more light
beam transmitters and one or more light beam receivers; and

15 c. said electro-optical light guard means including one or more optical
repeating nodes using an optical receiver and an optical transmitter for
creating the redirection of said light beam(s).

8. A load change safety system as described in claim 7 comprising:

20 a. said redundant means includes a plurality of hydraulic cylinders for
raising and lowering said stacking deck;

20 b. said hydraulic cylinders are of adequate strength such that should
one cylinder fail to provide support for said stacking deck, the remaining
cylinder(s) can support the weight of said stacking deck;

25 c. a plurality of valves, wherein at least one valve is independently
connected to each of said cylinders, which may selectively and alter-
natively permit and prevent flow of fluid from those of said hydraulic
cylinder(s) which are operating normally and have not failed, thereby
resulting in rapidly preventing said variable pinch point gap from
narrowing; and

25 d. light guard control means operatively connected to said electro-
optical light guard means and operatively and independently connected

1 to each of said valves for alternatively permitting and preventing flow
of fluid from said hydraulic cylinders.

9. A load change safety system as described in claim 7 comprising:

- a. said redundant means include one or more hydraulic cylinders
5 for raising and lowering elevating platform of said conveying sheet
material removal system.
- b. a plurality of valves, wherein said valves are operatively connected
10 to each other and said cylinder(s) by means such that all of said
valves must simultaneously be activated and operate normally for
selectively and alternatively permitting and prevent flow into said
hydraulic cylinder(s) which are operating normally and have not failed,
thereby preventing said variable pinch point gap from narrowing; and
- c. light guard control means operatively connected to said electro-
optical light guard means and operatively and independently connected
15 to each of said valves for alternatively permitting and preventing flow
of fluid into said hydraulic cylinders.

10. A load change safety system for a sheet stacker as described in claim 7
comprising:

- a. said one or more light beam transmitters include modulating
20 transmitter means for creating a modulated optical signal;
- b. said light beam receivers include modulated signal detection means
for receiving and determining that a selected modulated optical signal
is being received; and
- c. said modulated signal detection means is constructed such that
blockage of said light guard perimeter and/or any failure of said
25 electro-optical light guard means result in same light guard output
signal.

11. A load change safety system for a sheet stacker as described in claim 7
comprising:

- 1 a. remote control means operably connected to said sheet stacker allowing the operator to selectively allow the reduction of said variable pinch point gap;
- 5 b. said remote control means is mounted on a boom which is swivelly attached to or adjacent to said sheet stacker; and one of said optical repeating nodes is mounted on the movable part of said boom as part of said light guard perimeter.

12. A load change safety system for a sheet stacker as described in claim 7 comprising:

- 10 a. said light guard means including optical repeating nodes which are selectively located at stations so that the light beam(s) crossing conveying sheet material removal system between stations is at least a minimum distance from said discharge end of said stacking deck of said sheet stacker to allow one or more completed full stacks to be transported far enough to allow said stacking deck to lower and begin building a second full stack without blocking said light beam(s) crossing said conveying sheet material removal system; and
- 15 b. said conveying sheet material removal system includes a travel limit control means by which said one or more full stacks are automatically stopped at a position assuring that they do not block said light beam(s) crossing said conveying sheet material removal system once transported just short of said minimum distance in order to allow said stacking deck to lower to begin another full stack.

13. A load change safety system for a sheet stacker as described in claim 12 wherein:

- 20 a. said conveying sheet material removal system includes a manual load release control actuated by an operator to permit said complete full stack(s) to travel through and downstream of said location of said light beam(s) crossing said sheet material removal system between said optical repeating nodes located at said stations.

1 14. A load change safety system for a sheet stacker as described in claim 12
wherein:

5 a. said travel limit control means of said sheet material removal sys-
tem is operably connected to light guard control means to release said
complete full stack(s) to travel through and downstream of said loca-
tion of said light beam(s) crossing said sheet material removal system
after said stacking deck has made its full down cycle.

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